

Remarks

This Preliminary Amendment cancels without prejudice original claims 1-9 in the underlying PCT Application No. PCT/EP2005/050399 and adds new claims 10-28. The new claims conform to U.S. Patent and Trademark Office rules and do not add new matter to the application.

In accordance with 37 C.F.R. § 1.125(b), the Substitute Specification (including the Abstract, but without the claims) contains no new matter. The amendments reflected in the Substitute Specification (including Abstract) are to conform the Specification and Abstract to U.S. Patent and Trademark Office rules or to correct informalities. As required by 37 C.F.R. § 1.121(b)(3)(ii) and § 1.125(c), a Marked Up Version Of The Substitute Specification comparing the Specification of record and the Substitute Specification also accompanies this Preliminary Amendment. Approval and entry of the Substitute Specification (including Abstract) are respectfully requested.

The underlying PCT Application No. PCT/EP2005/050399 includes an International Search Report, dated May 19, 2005. The Search Report includes a list of documents that were uncovered in the underlying PCT Application.

Applicants assert that the subject matter of the present application is new, non-obvious, and useful. Prompt consideration and allowance of the application are respectfully requested.

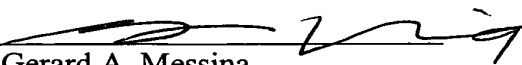
Respectfully Submitted,

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DIRECT PLUG-IN CONNECTION INCLUDING A CABLE END SLEEVE

Field of the Invention

The ~~present~~ invention relates to a removable electrical plug-in connection made up of a connector and a mating connector; the mating connector includes a p.c. board and has at least one contact area which is connectable at least in part to the connector.

~~Background Information~~ Description of Related Art

10 Plug-in connections in varied designs are known. As a rule, they are made up of a connector, e.g., a plug, which is insertable into a mating connector, e.g., a socket, in order to establish a removable electrical plug-in connection. Both connectors are connected to cables. With its outside
15 diameter, the connector is in contact, at least in part, with the inside diameter of a socket of a mating connector, thereby establishing an electrical contact.

Other mating connector designs have p.c. boards on which
20 switching elements are situated. In addition, these p.c. boards also have contact areas into which connectors are insertable. As a rule, these contact areas are sockets which are situated directly on the p.c. board.

~~Disadvantages of the Related Art~~

The above-described design according to the related art has the disadvantage that this is not a reliable electrical connection which is able to withstand fretting corrosion.
30 Micro-movements between the contacts and great insertion forces, which are necessary to prevent unintentional loosening, cause, in multipole plug-in connections in particular, this type of corrosion which has an adverse effect

on the quality of the electrical plug-in connection.
Furthermore, only expensive and, in technical terms, complex
approaches for contacts are known, which meet the high
technical demands such as current transfer, insertion cycles,
shaking, etc.

~~Object of the Invention~~ SUMMARY OF THE INVENTION

~~The~~ It is an object of the present invention is to propose a
reliable electrical and removable plug-in connection in which
a connector is contactable with a mating connector and in
which the mating connector has a contact element, e.g., in the
form of a board, p.c. board, or similar.

~~Achievement of the Object~~

~~The object is achieved by the features of Claim 1. This and~~
other objects of the invention are achieved by a removable
electrical plug-in connection comprising a connector and a
mating connector, the mating connector including a contact
element, in particular a p.c. board, or similar, having at
least one contact area which is connectable at least in part
to the connector, wherein the connector includes at least one
clamping element which grips at least in part around the
contact element in its contact position, and this clamping
element presses at least a part of the contact element against
the contact area for establishing the electrical plug-in
connection.

~~Advantages of the Invention~~ BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in greater detail with
reference to the following drawings wherein:

Figure 1 shows a perspective view of the mating connector according to the present invention including partially shown contact elements.

- 5 Figure 2 shows a perspective view of an exemplary embodiment of a contact element.

DETAILED DESCRIPTION OF THE INVENTION

- 10 One of the advantages of the present invention is that the proposed connecting technology is very space-saving and finds sufficient space in a housing of a connector. In addition, the connection may be securely established, so that an electrical plug-in connection is ensured in any type of
15 combination of connector and mating connector.

- Furthermore, it is an advantage that an electrical connection may be established directly so that the pins or male connectors of an electrical plug-in connection, customary per
20 se, are no longer necessary. Pins or male connectors may be avoided in this way. In addition, this type of design of an electrical plug-in connection may be very easily used in sensors, valves, or similar components in which a removable electrical plug-in connection is to be implemented, but in
25 which the necessary installation space for this is extremely limited.

- ~~Further advantageous embodiments arise from the subsequent description as well as from the claims.~~

- 30
Drawing

~~Figure 1 shows a perspective view of the mating connector according to the present invention including partially shown contact elements;~~

5 ~~Figure 2 shows a perspective view of an exemplary embodiment of a contact element.~~

~~Detailed Description of the Exemplary Embodiments~~

10 Figure 1 shows a mating connector 1 in section. It is made up of a housing 2 as well as a contact element 3 situated in the housing, contact element 3 being a p.c. board in this exemplary embodiment. Connector 12 is made up of a contact carrier 11, contact element 6 and clamping elements 4 which
15 are situated on both sides of contact elements 6. Contact carrier 11 additionally has apertures 5, through which contact elements 6 are insertable. Connector 12 may include a plurality of contact elements 6 shown here (multi-pole plug connector).

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In contact position, as it is shown in Figure 1, contact elements 6 end in contact area 7 of contact element 3. The ends of the contact element 6 are designed in such a way that they are in contact on both sides of contact element 3 in its
25 longitudinal extension, thereby establishing an electrical connection between contact element 6 and contact element 3 of mating connector 1. For fixing contact elements 6 on contact element 3, clamping elements 4 of contact carrier 11 are provided which, in the exemplary embodiment shown here, grip
30 around the ends of contact element 6, at least partially, and press contact element 6 against contact areas 7 of contact element 3.

The clamping effect of clamping elements 4 may be created in different ways:

5 First, there is the possibility that clamping elements 4 are displaceably positioned elements which effect fixing of contact elements 6 either by joining contact carrier 11 or by using actuators, which are not shown in the drawing in greater detail.

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Second, there is the possibility that clamping elements 4 have latching elements, into which contact elements 6 latch in their contact position (as shown in the drawing).

15 In order to create an optimized contact possibility between contact element 3 and contact element 6, provision is made to use contact element 6 including a sleeve 8 as it is shown in Figure 2. This sleeve 8 is made of an electrically conductive material which is slid over the contact area of contact

20 element 6. Beads 10 are provided on outer surface 9 of sleeve 8 which create defined contact points with contact element 3 in contact area 7. As an alternative, sleeve 8 is also

fixable via an at least partially insulated end of a cable, thereby creating a connector in a simple manner. This creates

25 the possibility of omitting male connectors and pins and avoiding complex connecting methods between the male connectors or pins and the cable end.

~~What Is Claimed Is:~~

Abstract

ABSTRACT OF THE DISCLOSURE

~~Described is a~~ A removable electrical plug-in connection comprising a connector and a mating connector, the mating
5 connector including a contact element, in particular a p.c. board, or similar, having at least one contact area which is connectable at least in part to the connector. It is provided that the connector ~~(12)~~ includes at least one clamping element
~~(4)~~ which grips at least in part around the contact element
10 ~~(6)~~ in its contact position, and this clamping element ~~(4)~~ presses at least a part of the contact element ~~(6)~~ against the contact area ~~(7)~~ for establishing the electrical plug-in connection.

15 ~~(Figure 1)~~